

Geomagnetic total intensity change before and after the eruptions at Shinmoedake volcano in 2018 detected by aeromagnetic surveys

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As previous reports, so far, we have conducted aeromagnetic survey six times at Shinmoedake volcano after the 2011 eruption, and detected geomagnetic total intensity change by remagnetization due to cooling of lava in the main crater. According to a rate of change, thermal diffusion may be the main cause of cooling process.

Shinmoedake erupted again in March, 2018 and lava of 14Mm³ volume was accumulated in the main crater.

After the eruption, we conducted aeromagnetic survey again by using an unmanned helicopter. The geomagnetic total intensity change from the first survey in May 2011 is about 800 nTpp. Supposing a single dipole by magnetization of lava in the crater, a magnetic dipole moment is about 81MAm². This value is bigger by 10MAm² than a value inferred from a rate of change due to cooling of 2011 lava. Thus, this change is caused by magnetization of 2018 lava, which is abruptly cooled down at the surface and enhanced remagnetization.

Comparing the change of geomagnetic field in 2018 with one in 2011, however, a rate of change becomes about half. Supposed rock magnetization of 2018 lava is the same with one of 2011, a part of lava must demagnetize. It indicates that, at the 2018 events, the 2011 lava in the crater may be heated and some portions of it demagnetize.

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